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Group Project 2
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For our second group project, we decided to text the fluid phenomenon of vortecies created in a flume. We originally tried to create a vortex by cutting a whole in the bottom of a plastic bottle, fill it with water and inject die as the water poured through the bottom of the bottle. We attempted this idea many times, in many different ways, but because of how fast the water fled through the bottom of the bottle, it was hard to capture a clear, in focused image. After this attempt, we decided we wanted to still observe this same phenomena, but we would use the flume to document the vortecies created. We seek to both understand the physics of these processes in different regimes of interaction and to predict the force on the body exerted by the flow during the vortex-flow interaction. We observed a viscous fluid pass a circular cylinder which was placed midway between the two parallel walls in a channel.

First we placed a cylinder in between the walls of the flume. WE proceeded to fill the flume with water until it was about two inches above the object inside. As the water was continuously moving downstream, we injected the dye from the top of the open flume, angled towards the cylinder. When the dye hit the cylinder, it difussed out, and around the blockage in the flume. When the injected dye streamed around the circlular object, the continuous fluid flow created vortecies. The results show that the flow resistance varies with flow depth, stem concentration, stem length, and stem diameter. The food coloring was proven denser than water by the fact that the majority of it wanted to sink to the bottom of the channel. Another interesting phenomena that was revealed by the food coloring was the boundary layer separation that occurred after the dye hit the cylinder.

An open flume installation typically comprises a flume defined by a back wall, a floor and a pair of laterally spaced vertical side walls. The side walls, floor and back wall define an open flume in communication with an upper elevation water source.. Vortex formation can be abated by increasing the depth of the turbine intake.
The present study examines nonlinear interactions for various types of the structured surface in cases where surface induced flow modes and vortex modes are operative. The flow is divided into an inviscid core and two viscous wall layers. The structured surface develops flow modes which is dependent on amplitude and can contribute to a source for the flow vortices. The structured surface is found to be able to affect the scales, variations and shape of the induced vortices. Vortex cutting is also accompanied by a boundary layer fluid both upstream and downstream within the vortex core, and by the formation of vorticity waves which propagate both downstream and upstream.

The image was captured with an aperature of 5.6 and a shutter speed of 1/40. It was hard to capture a clear, sharp image because the water and flow was at a constant movement. The focal length was 135. A flash was not used because the light source was bright enough to allow us to photograph the image without extra outside light. The flash would have caused a reflection on the glass of the flume. The ISO speed was 1600. I used photoshop to increase the contrast of the image and to boost the color. Photoshop was not used to change the color nor to add any additional phenomena to the final image.

I think the image I chose exemplifies the phenomena and has distinct vortecies created by the fluid movement around the cylinder. I wanted an image that was clear but it was hard to capture the vortecies in motion, therefor many different attempts were made in order to visually see the vortecies. I felt we ran into a few issues throughout the process of this project, but finally found a way to create the phenomena that we wanted to show.